

ABSTRACT OF THE DISCLOSURE

A set of pre-stack seismic data is downward extrapolated, by first determining a migration interval in the seismic data set. A maximum error criterion is selected for the migration interval. A maximum relative error in phase calculated as a function of frequency, propagation angle, and the relative variation in velocity in the migration interval. The maximum relative error in phase is compared to the maximum error criterion. The type of extrapolation to use in the migration interval is determined from the comparison of the maximum relative error in phase to the maximum error criterion. The type of extrapolation is selected from a set comprising Gazdag phase-shift extrapolation, split-shift Fourier extrapolation, and implicit finite difference extrapolation.